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Quality Assessment of Drinking Water in KADA

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Abstract: Kada is a village which lies in district Beed of Maharashtra State in India, and is well known as a strongly drought prone area. The present studies are carried out to find the water quality and purity of drinking water. Water samples were assessed for physic-chemical analysis, for bacteriological analysis and for demand analysis. The different physicochemical parameters studied are pH, Turbidity, Chlorides, Nitrtes, Sulphates, TDS, Hardness, Alkalinity, and Fluoride. For studying demand analysis Dissolved Oxygen Content, Biochemical Oxygen Content, and Chemical Oxygen content is determined. Purity and potability of water is also assessed by determining bacteriological analysis of drinking water in Kada. Researcher assessed potability as per IS 10500 -2012 for drinking water quality assessment
Keywords: Physico-chemical analysis, Demand Analysis, Bacteriological analysis.

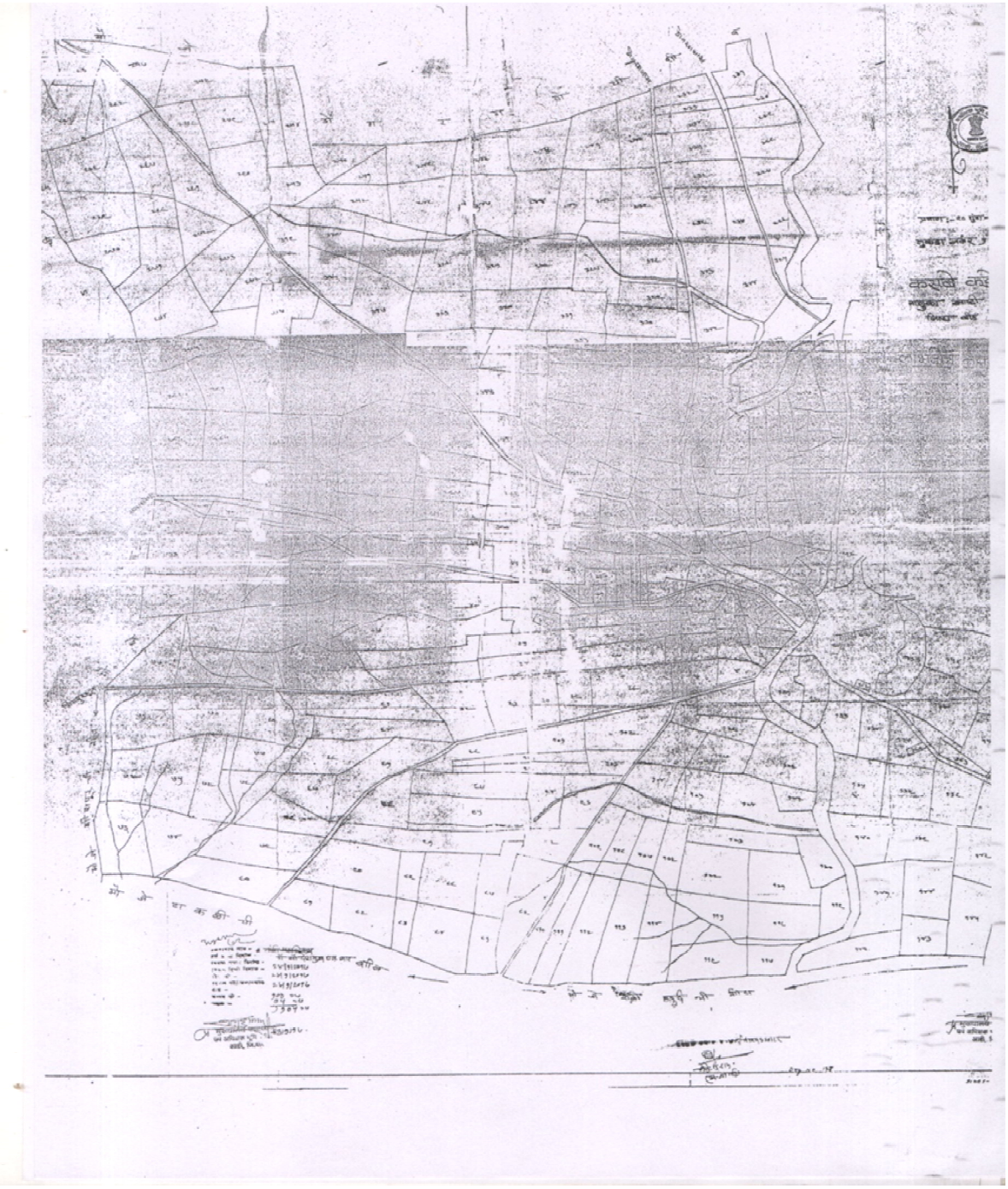
I. INTRODUCTION

Drinking water is among one of the basic needs for life on earth. It is essential for survival and it is birth right of every living being to get it in its purest possible form for drinking. It is essential for survival of all living beings from simplest herbs and microorganisms like bacteria ,viruses up to complex systems of human body(**1-3**). As per previous researches, more than one billion people all over the world do not have ready access to an adequate and safe water supply and more than 800 million of those live unsaved in rural areas. In India, ground water is being used as raw water for 85% public water supply. According to world health report 1998; 75% of the population is always prone to loss of their lives at cost of different water-borne disease. Water contaminants commonly found in drinking water are pathogenic microorganisms, physicochemical contents; metals, pesticides oil and grease etc. become hazardous to human health. The physico-chemical characteristics of the aqueous phase have direct influence on the types and distribution of aquatic biota as well as on the health of the human being. With this pace the present study is carried out for determination of indicator parameters, in the ground water bodies of Kada Town. Demand analysis has also been studied along with bacteriological analysis.It is observed that by environmental measurement systems that, the amount of dissolved oxygen at 100 % saturation at sea level at 20 C is 9.03mg/L. Dissolved oxygen in natural water resources is an important source of oxygen supply to all living beings including aquatic life. But its amount should be adequate enough and should not exceed permissible limits laid down by CPCB or WHO, as more amount of oxygen content present causes harmful effects. For instance, higher concentration of dissolved oxygen levels, speeds up corrosion of water pipes. Hence it is very important to maintain proper levels of dissolved oxygen in drinking water. As it is DO, chemical oxygen demand (COD) is the amount of oxygen required for chemical oxidation of organic pollutional load present in water while biological oxygen demand BOD is the amount of oxygen required by the biological matter present in water. Demand Analysis signifies the total organic pollution load if present in drinking water.

Demand analysis includes determination of demand of oxygen to oxidize organic matter present in water bodies as pollutant.

Kada is a village in Ashti Tahsil of Beed district of Maharashtra State, in India This region is known to be adversely drought prone area. The total population of the village is about 15,000, and there are near about 3000 houses.. It belongs to Marathwada region and also Aurangabad division. It is located 83 Km towards west from district head quarters of Beed and 6 Km from Ashti, as well as 274 Km from State capital, Mumbai. Its height from sea level is 552 meters above sea level. There is a Lignius type of rock, all over in the town, which is a Primary rock, and thus water does not get percolated properly. Total rainfall per annum in the village and vicinity is very less and is near about 500-600 mm only. The main source of water supply in the village is Bore-well or Tube-well which are about 400 to 700 feet in depth.

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A. map of town, kada, ; (source : department of land records, ashti)

Drainage system in the city is open drainage system. The untreated domestic water from human settlement find their way into the river through outfall, drain etc. This in turn results in organic, bacterial, pollution of natural water resources and its aggravation day by day. Water which is to be utilized for human consumption should be free from pathogens as it may create epidemics also it should be free from hazardous chemicals as are risky to health. The permissible limits are laid down by American Public Health Association (APHA), World Health Organization (WHO), Indian Standard Institution (ISI), Central Pollution Control Board (CPCB) and Indian Council of Medical Research (ICMR) are compared in this review article. The following method are used for test water quality.

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II. MATERIALS AND METHODS

All the reagents used for present study were of BDH ANAL grade with highest purity. ELICO pH meter, Incubator; Systronics make SPECTROPHOTOMETER; and BOROSIL make Glass wares are used for experiment station. The methods employed in present study are as per Manual On Water and Waste Water Analysis published by NEERI, Nagpur.

III. EXPERIMENTAL

The water samples have been analyzed for study of water quality assessment and physico-chemical parameters , demand analysis and bacteriological analysis.

Survey of the city have been done and on the basis of topography with the help of Map. Samples from Seven samples from different sources i.e. stagnant water bodies, tap water, open dug well and bore well, have been collected. Study has been carried out in the month of January to March. The analysed values have been then compared with permissible standard according to the Indian Standards IS 10500 & IS 2490. The analytical methods applied for determination of indicator parameters were also according to these standards.

IV. RESULT AND DISCUSSION

The discharge of wastes from municipal sewers which contains human faeces forms the important basis of bacteriological pollution of water.Water contaminated with such effluents may contain pathogenic microorganisms which cause health hazard to human health. Such feacal contamination of water is routinely determined by conducting microbiological analysis. The contamination is supposed to be severe when the indicator organisms are present in large numbers. Such bacteria's are present in clumps in large numbers and do not present as individual bacteria. Hence the number of clumps of bacteria are to be counted while enumerating bacteria. Total coliforms refers to a large group of Gram negative, rod shaped bacteria that share several characteristics. The group includes Thermo tolerant coli forms and bacteria of faecal origin, as well as some bacteria that may be isolated from environmental sources. Hence the presence of coliforms may or may not indicate faecal contamination. Total coliforms including E. Coli, is the working name of a small class of gram – negative Enterobacteriacea that ferment lactose to produce gas and acid when incubated at 35^0C for 24 – 48 hours. Faecal coliform is the heat inhibited thermo tolerant form of E. Coli bacteria that continue to ferment some lactose to produce some gas and acid when incubated at 44.5^0C for only 24 hours. Thus more than 95% of thermo tolerant coli forms isolated from water are the gut organisms. According to WHO, it is observed that the mortality rate of water associated diseases exceeds 5 million per year. In general, the greatest microbial risks are associated with ingestion of water that is contaminated with human animal farces. The major source of faecal microorganisms is the discharge of wastewaters in fresh water resources. An adequate and accessible water resources must be available to all as water is an essential entity for life. Improving access to safe drinking water can result in significant benefits to health. Thus to achieve safe drinking water quality, all efforts should be taken. To improve water quality, Rain water harvesting could be a possible way. In the present research, an effort has been made to carry out comparative study on Bacteriological analysis of harvested rain water and a non harvested one. To detect the presence of coliforms in water, two techniques are commonly used. In these studies, "Multiple Fermentation Tubes also called as MPN," technique is used as it can be easily applicable to all types of waters. Inthis method portions of a water sample are placed in test- tubes containing a culture medium. The tubes are then incubated for at 27^0C for 48 hours. Feacal coliform bacteria, or thermo tolerant bacteria are studied, for their presence, in the laboratory by their ability to ferment lactose, with production of acid and gas at 44.5^0C, for 24hours by using Brilliant Green Lactose bile broth media. Confirmatory tests were repeated by following ring tests using Covax Reagent. All the results obtained were compared with permissible limits laid by WHO-UNEP-1996. The results obtained for seven water samples with different sources are as given in Table1.

Table 1. Bacteriological Analysis Data At Different Sites

Sample Description	Coli forms/100ml	Thermo tolerant Coli forms/100ml	E. Coli /100ml
BhaginiNiveditaVidyalaya(B.N.V)	00	00	00
Residene beside B.N Vidyalaya	More than 16	16	16
ZillaParishad School,	03	00	03
Residence beside Z. P school	09	06	06
Mainstream Of Gram Panchayat	09	06	06

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Office			
Motilal Kothari Vidyalaya	More than 16	More than 16	16
Hotel at S. T stand	More than 16	More than 16	06

A. Demand analysis

BOD indicates amount of organic matter present in water. Thus, a low BOD content in water is appreciable for its good quality. High BOD content indicates presence of organic pollutants in water. While when Dissolved oxygen content drops down in any water sample, then aquatic life in that water cannot survive much. Biological Oxygen Demand is oxygen demand for nontoxic organic waste.

The ratio of BOD: COD describes organic toxicity because COD is a measure of total of i.e toxic and non – toxic organics and BOD is a measure of nontoxic organic load because COD is a measure of total (toxic and nontoxic) organics and BOD is a measure of nontoxic organic load.Furthermore, when DO content of water is less it does mean that, dissolved oxygen of that water is being consumed by bacterias present in it. It subsequently indicates that such water is polluted with sewage organic waste or other discharges. For good quality of water, COD:BOD ratio should be less . Thus high BOD and low DO are the consequences of water pollution by organic wastes. Such water should be treated before use. Demand analysis results are as given in Table 2.

Table 2.DEMAND ANALYSIS OF DRINKING WATER AT KADA

Sample Description	D O mg/L	B O D mg/L	C O D mg/L
BhaginiNiveditaVidyalaya(B.N.V)	3.5	32.00	172.88
Residene beside B.N Vidyalaya	4.8	36.35	272.55
ZillaParishad School,	6.4	27.72	211.20
Residence beside Z. P school	6.6	24.0	192.00
Mainstream Of Gram Panchayat Office	6.8	22.50	285.35
Motilal Kothari Vidyalaya	8.8	47.50	263.22
Hotel at S. T stand	6.4	68.0	320.30

Water samples collected from MKV, School and from a Hotel near S. T. Stand, shows high BOD, and less DO, comparatively.

V. CONCLUSION

The water supply at MK Vidyalaya was suggested to stop immediately as students of the school used to drink it every day. Immediate cleaning of the water tank was done followed by standard dosing of chlorination to purify the water. At two residences and at Gram Panchayat office also immediate actions were taken. Tanker water users were also educated and asked to do Chlorination immediately as at Hotel at S. T.Stand shown some contamination, and its source is tanker water.

The collected water samples have also been tested for determination of indicator parameters for organic pollution, that is DO, BOD and COD, and the results obtained for samples tabulated as above. Low DO content and high COD content shows that water is to be treated for proper oxygenation and organic load should be decreased. Especially sample from M.K.Vidyalaya shown presence of E. Coli shows contamination of water. Water samples collected from MKV, School and from a Hotel near S. T. Stand, shows high BOD, and less DO, comparatively. The treatment to these sources is essential and such is suggested too. More detail studies should be carried out, but still water supply from these sources were discontinued and will restarted after treatment only.

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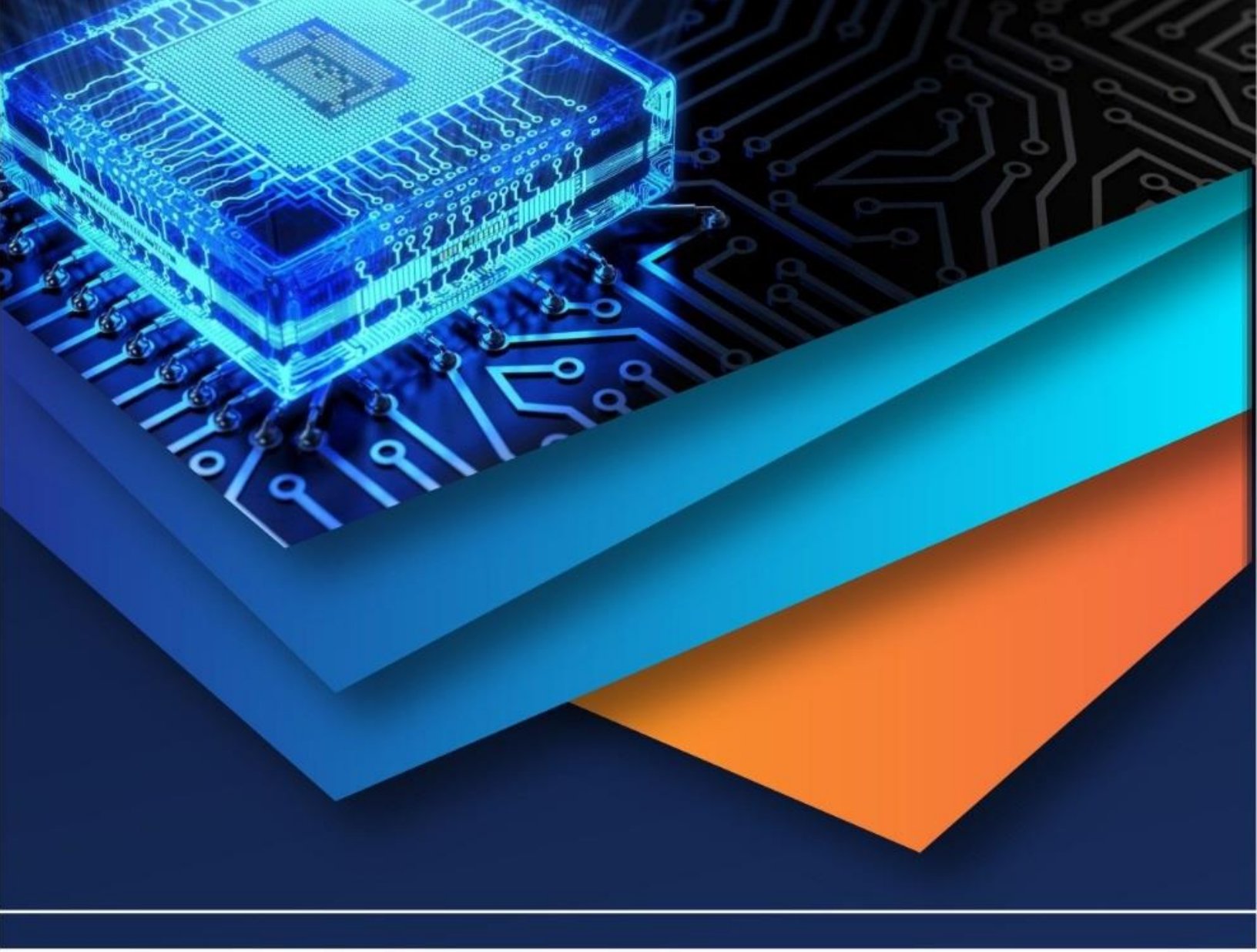
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